SECTION 26 0553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

****

LANL MASTER SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the ESM Electrical POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within “stars” during editing.

Specification developed for ML-3 / ML-4 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

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PART 1 GENERAL

1.1 SECTION INCLUDES

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Edit the following articles to match project requirements; delete articles not applicable to Project.

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A. Component identification tags.

B. Equipment nameplates.

C. Outlet labels.

D. Wire markers.

E. Voltage markers.

F. Warning signs.

G. Arc flash warning labels.

H. Working space markers.

I. Underground warning tape.

J. One-line diagrams and operating instructions.

1.2 LANL PERFORMED WORK

A. None

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01 330 Submittal Procedures:

1. Catalog Data: Submit manufacturer's catalog literature for each product required.

2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

****
Include the following paragraph for submission of samples for selection of finish, color, texture, and other properties.
****

3. Samples:

   a. Submit [two] [_____] samples of each type of printed identification products applicable to project.

   b. Submit [two] [_____] nameplates illustrating materials and engraving quality.

4. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of the National Electrical Code (NEC) and OSHA.

B. Conform to applicable requirements of the following ANSI Standards:

1. Z535.1 Safety Color Code.

2. Z535.2 Environmental and Facility Safety Signs.

3. Z535.3 Criteria for Safety Symbols and Labels.

4. Z535.4 Product Safety Signs and Labels.

5. Z535.5 Safety Tags and Barricade Tapes (for Temporary Hazards).

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Alternate products may be accepted; follow Section 01 2500, Substitution Procedures.

****
Edit the following articles to match project requirements; delete those that do not apply to the Project. Refer to LANL ESM Chapter 7 Section D5000 Part 7.0.
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2.2 COMPONENT IDENTIFICATION TAGS

A. Furnish component identification tags as specified below [and scheduled on the Drawings] to identify electrical equipment using the system designation, equipment identification, tech area number, and building number.

B. Coordinate electrical component identification tag schedule with final equipment identification scheme for project.

C. Provide component identification tags with black letters on yellow background with 2 in. by 3 in. dimensions.

D. Provide minimum 48 point size lettering.

E. Provide tags made of one of the following materials:

1. Type 1 (Indoor Applications Only):

   a. Laminated plastic adhesive tape with machine printed letters.

   b. Manufacturer: Brother, Seton, Brady.

2. Type 2:

   a. Two-ply plastic nameplate with letters engraved through yellow surface showing black core.

   b. Provide UV stabilized material for outdoor applications.

   c. Manufacturer: Seton Nameplate Corp.

2.3 EQUIPMENT NAMEPLATES

A. Furnish equipment nameplates as specified below [and scheduled on the Drawings] to indicate the following information:

1. Category I nameplates:

   a. Served by nameplates: circuit directory information including circuit number, equipment identification, and location of equipment serving the item, plus the voltage, number of phases, and number of wires.

   b. Serves nameplates: circuit directory information including circuit number, equipment identification, and location of equipment served, plus the voltage, number of phases, and number of wires.

2. Category II nameplates – general or operational information including basic instructions or specific operating procedures.

3. Category III nameplates – emergency operations information including emergency shutdown procedures.

B. Coordinate equipment nameplate schedule with equipment numbering scheme provided by Contract Administrator.

C. Provide nameplates made of one of the following materials:

1. Type 1 (Indoor Applications Only):

a. Laminated plastic adhesive tape with machine printed letters.

b. Manufacturer: Brother, Seton, Brady.

2. Type 2:

a. Two-ply plates with letters engraved through surface color showing core color.

b. Use UV stabilized material for outdoor applications.

c. Manufacturer: Seton Nameplate Corp.

D. Provide 10 point minimum size lettering.

E. Provide colors as follows:

1. Category I nameplates: white or black letters on blue background.

2. Category II nameplates: white letters on black background.

3. Category III nameplates: white or black letters on red background.

F. Dimensions shall be as follows:

1. Category I nameplates: 1 inch by 2 1/2 inch minimum.

2. Category II nameplates: as required for instructions, 1 inch by 2 1/2 inch minimum.

3. Category III nameplates: as required for instructions, 1 inch by 2 1/2 inch minimum.

2.4 OUTLET LABELS

A. Furnish a typewritten or machine printed label for each switch and receptacle outlet indicating circuit number, panelboard, and voltage.

B. Provide labels of the following materials:

1. Laminated plastic adhesive tape with machine printed letters.

2. Manufacturer: Brother, Seton, Brady.

C. Provide black, 10 point minimum size lettering on a white background.

2.5 WIRE MARKERS

A. Provide wire markers for power, control, instrumentation, alarm, and communication circuit wires.

B. Furnish split sleeve, heat-shrinkable sleeve, or self-laminating adhesive wire markers.

C. Locate a wire marker on each conductor at switchgear, panelboards, pull boxes, outlet and junction boxes, and each load connection.

D. Provide typewritten lettering on wire markers as follows:

1. Power and lighting circuits: as-built branch circuit or feeder circuit number.

2. Control circuits: as-built control wire number indicated on schematic and interconnection diagrams or equipment manufacturer's wiring diagrams.

E. Manufacturer: LEM Products, Inc., Brady, Panduit.

2.6 VOLTAGE MARKERS

A. Furnish voltage markers for transformers, switchgear, panelboards, starters, motor control centers, safety switches, pull boxes, cabinets, and conduits.

B. Provide flexible pressure sensitive vinyl markers with minimum 1-1/8 inch X 4-1/4 inch orange background and black letters.

C. Provide voltage markers with lettering indicating the highest voltage present as follows:

1. 208Y/120 volt system: 208 VOLTS

2. 120/240 and 240 volt system: 240 VOLTS

3. 480Y/277 and 480 volt system: 480 VOLTS

4. 13.2 kV systems: 13200 VOLTS

5. Fire alarm system: FIRE ALARM

6. Telephone/data system: TELEPHONE

D. Manufacturer: Electromark, LEM Products, Inc.

2.7 EMERGENCY SYSTEM IDENTIFICATION

A. Furnish identification for emergency system generators, transfer switches, transformers, switchgear, panelboards, starters, motor control centers, safety switches, pull boxes, junction boxes, enclosures, and cabinets as require by NEC Article 700.

B. Provide flexible pressure sensitive vinyl markers with minimum 1-1/8 inch X 4-1/4 inch orange background and black letters indicating EMERGENCY SYSTEM.

2.8 WARNING SIGNS

A. Furnish warning signs for low-voltage and medium-voltage transformers, switchgear, switchboards, panelboards, motor starters, motor control centers, safety switches, pull boxes, and cabinets.

B. Use flexible warning signs that conform to ANSI Z535.4 and OSHA Danger and Caution specifications.

C. Provide minimum 2 inches X 4 inches warning signs.

D. Provide warning signs with format and lettering as follows:

1. Signal word: DANGER

2. Signal word panel color: red with safety alert symbol.

3. Word message:
   Keep Out!
   Hazardous voltage inside
   Will shock, burn, or cause death.

4. Safety symbol: ISO 3864 “lightning bolt” in yellow triangle.

E. Materials:

1. For indoor applications use flexible, pressure sensitive, polyester base with polyester overlaminate.

2. For outdoor applications use aluminum signs.

F. Manufacturer: Seton Name Plate Co., Safety Label Solutions, Hazard Communication Systems, Electromark.

2.9 ARC FLASH WARNING LABELS

A. Furnish arc flash and electrocution hazard warning labels for switchgear, transformers, panelboards, industrial control panels, motor controllers (including

those furnished with mechanical equipment), motor control centers, safety switches, and other equipment as required by the NEC.

B. Provide warning labels that comply with Z535.4. Color in top part of sign shall be ANSI “safety orange”. All lettering on labels shall be black.

C. Provide labels that are printed on self-adhesive polyester with pressure-sensitive adhesive back and covered with a clear polyester film. Outdoor labels shall be suitable for a high-UV environment.

D. Label dimensions shall be approximately 4 inches high by 5 inches wide.

E. Provide labels similar in design to that below. Use a black, UV-resistant, permanent marker to legibly fill in the application-specific information indicated in the notes.

Arc Flash and Shock Hazard.
Wear Appropriate PPE.

Determine appropriate protective clothing and personal protective equipment (PPE) for the task from NFPA 70E.

48 inch [1]	**Flash Hazard Boundary**
18 kA [2]	**Short Circuit Current Available for 0.015 sec [3]**
480 VAC [4]	**Shock Hazard when Cover is Removed [5]**
42 inches [6]	**Limited Approach Boundary**
12 inches [6]	**Restricted Approach Boundary**
1 inch [6]	**Prohibited Approach Boundary**

Equipment Identification Code: **030040-EP-PP-A [7]**

Application-specific information:

1. Flash hazard boundary per NFPA 70E.
2. Available short circuit current (RMS symmetrical amperes) calculated in accordance with the LANL Engineering Standards Manual.
3. Upstream overcurrent protective device fault clearing time (seconds)

calculated in accordance with the LANL Engineering Standards Manual based on the short circuit current available.
4. System phase-to-phase voltage.
5. Condition that exposes worker to electrical shock hazard.
6. From NFPA 70E based on nominal system phase-to-phase voltage.
7. Equipment ID code based on Drawings and including TA number, building number, and system identifier.

F. Manufacturer: Summit Electric Supply, Seton Name Plate Co., Safety Label Solutions, Hazard Communication Systems, Electromark.

2.10 WORKING SPACE FLOOR MARKERS

A. Provide paint or tape to mark the working space on the floor at electrical equipment.

1. Tape: 2-inch wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay. Manufacturer: 3M Safety Stripe Tape 5700.

2. Paint: black and white colors to be applied in 2-inch wide stripes or checkers. Refer to Section 09 9100 Painting.

2.11 WORKING SPACE LABELS

A. Provide labels indicating required working clearance at electrical equipment that is likely to require examination, adjustment, servicing, or maintenance while energized.

1. Material: self-adhesive polyester with pressure-sensitive adhesive back. Outdoor labels shall be suitable for a high-UV environment.

2. Dimensions: approximately 6-3/4 x 2 inches.

3. Signal word: “NOTICE” in 48 point white italic letters on safety blue panel.

4. Word message: 24 point minimum black or safety blue letters on white background.

****
Edit the following articles to match project requirements; delete any that do not apply to Project. Verify voltages in specialized equipment installed as part of the Project.
****

a. Word message for 120/240-volt and 208Y/120-volt equipment: “KEEP AREA IN FRONT OF THIS ELECTRICAL EQUIPMENT CLEAR FOR 3 FEET. OSHA-NEC REGULATIONS.”

b. Word message for 480-volt and 480Y/277-volt equipment with exposed live parts on one side of the working space and no live parts on the other side of the working space: “KEEP AREA IN FRONT OF THIS ELECTRICAL EQUIPMENT CLEAR FOR 3-1/2 FEET. OSHA-NEC REGULATIONS.”

c. Word message for 480-volt and 480Y/277-volt equipment with exposed live parts on both sides of the working space: “KEEP AREA IN FRONT OF THIS ELECTRICAL EQUIPMENT CLEAR FOR 4 FEET. OSHA-NEC REGULATIONS.”

d. Word message for 4160Y/2400-volt equipment with exposed live parts on one side of the working space and no live parts on the other side of the working space: “KEEP AREA IN FRONT OF THIS ELECTRICAL EQUIPMENT CLEAR FOR 4 FEET. OSHA-NEC REGULATIONS.”

e. Word message for 4160Y/2400-volt equipment with exposed live parts on both sides of the working space: “KEEP AREA IN FRONT OF THIS ELECTRICAL EQUIPMENT CLEAR FOR 5 FEET. OSHA-NEC REGULATIONS.”

f. Word message for 13,200-volt equipment with exposed live parts on one side of the working space and no live parts on the other side of the working space: “KEEP AREA IN FRONT OF THIS ELECTRICAL EQUIPMENT CLEAR FOR 5 FEET. OSHA-NEC REGULATIONS.”

g. Word message for 13,200-volt equipment with exposed live parts on both sides of the working space: “KEEP AREA IN FRONT OF THIS ELECTRICAL EQUIPMENT CLEAR FOR 6 FEET. OSHA-NEC REGULATIONS.”

5. Manufacturer: Brother, Seton, Brady

2.12 UNDERGROUND WARNING TAPE

A. Furnish underground warning tape for underground cables, conduits and duct banks.

B. Use 6 inch wide, 0.004 inch thick, polyethylene underground warning tape black lettering and the following background colors:

1. Electric: red

2. Telephone/data: orange

C. Provide lettering that indicates the type service buried below.

1. Electric: "CAUTION ELECTRIC LINE BURIED BELOW"

2. Telephone/data: "CAUTION TELEPHONE LINE BURIED BELOW"

D. Manufacturer: Utility Safeguard, LLC.

2.13 ONE-LINE DIAGRAM CABINET(S)

A. Provide aluminum framed bulletin board cabinet(s) to display electrical one-line diagram(s) plus special operating instructions and emergency procedures as required.

1. Housing: extruded aluminum with manufacturer's standard outside dimensions of approximately [36" x 48"][36" x 60"][48" x 60"][48" x 72"] x 3" deep.

2. Doors: two sliding 3/16" tempered glass doors with ground-in finger pulls and flat key tumbler locks.

3. Back panel: tackable cork.

4. Finishes: manufacturer's standard finishes and colors.

B. Manufacturer: Claridge "Imperial Series"

PART 3 EXECUTION

3.1 EXISTING WORK

****
Delete this article when existing construction is not affected. Edit to match project requirements.
****

A. Install identification on existing [equipment] [_____] to remain in accordance with this section.

B. Install identification on unmarked existing [equipment] [_____].

C. Replace lost [nameplates] [labels] [markers].

3.2 EXAMINATION

A. Examine surfaces to receive identification products for compliance with installation tolerances and other conditions affecting performance of the identification products. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 COORDINATION

A. Verify electrical equipment designations with LANL through the Contract Administrator.

3.4 INSTALLATION - GENERAL

A. Install electrical identification products after completion of painting.

B. Install electrical identification products only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

C. Clean surface where electrical identification product is to be placed.

D. Use manufacturer's recommended adhesive for engraved tags and nameplates.

E. Place electrical identification products centered and parallel to equipment lines.

****
Edit the following articles to match project requirements; delete any that do not apply to Project. Refer to LANL ESM Chapter 7 Section D5000 Part 7.0.
****

3.5 COMPONENT IDENTIFICATION TAGS

A. Install component identification tag [as indicated on the Drawings] on the front of each piece of electrical equipment including switchgear, transformers, switchboards, panelboards, motor control centers, motor controllers, safety switches, and enclosed circuit breakers.

B. Position tags so they can be read from floor.

3.6 EQUIPMENT NAMEPLATES

A. Install equipment nameplate or nameplates [as indicated on the Drawings] on the front of each piece of electrical equipment including switchgear, transformers, switchboards, panelboards, motor control centers, motor controllers, safety switches, and enclosed circuit breakers.

****
Edit the following articles to match project requirements; delete any that do not apply to Project.
****

B. Provide Category III nameplate at the branch circuit breaker that provides AC power to the fire alarm control panel with wording "WARNING - AC POWER TO FIRE ALARM CONTROL PANEL - DO NOT TURN OFF WITHOUT AUTHORIZATION."

C. Provide Category III nameplate at the branch circuit breaker(s) that provide(s) AC power to life safety system components with wording "WARNING - AC POWER TO LIFE SAFETY SYSTEM - DO NOT TURN OFF WITHOUT AUTHORIZATION".

D. Provide a Category III nameplate at the branch circuit breaker(s) that provide(s) AC power to life security system components with wording "WARNING - AC POWER TO SECURITY SYSTEM - DO NOT TURN OFF WITHOUT AUTHORIZATION ".

E. Provide a Category III nameplate at the branch circuit breaker(s) that provide(s) AC power to safety system components with wording "WARNING - AC POWER TO SAFETY SYSTEM - DO NOT TURN OFF WITHOUT AUTHORIZATION".

F. Position nameplates so they can be read from floor.

3.7 OUTLET LABELS

A. Install outlet label on outside of device cover for each receptacle outlet and light switch.

3.8 WIRE MARKERS

A. Install wire markers on power, control and communication conductors at each appearance in locations such as pull boxes, outlet boxes, junction boxes, panelboards, switchgear, motor control centers, controllers, safety switches, enclosed circuit breakers, and load connections.

B. Position markers so they can be read from the front of the enclosure.

3.9 VOLTAGE MARKERS

A. Install voltage markers at the following locations and position markers so they can be read from floor:

****
Edit the following articles to match project requirements; delete any that do not apply to Project.
****

1. Front and rear of each medium-voltage switchgear.

2. Front of each medium-voltage transformer.

3. Front and rear of each free-standing low- voltage switchgear or switchboard section.

4. Front of each low-voltage transformer, panelboard, industrial control panel, motor control center, enclosed circuit breaker, safety switch, and motor controller enclosure, including those furnished with mechanical equipment.

5. Cover of each pull box containing low-voltage or medium-voltage conductors.

6. Each 2 inch and larger conduit longer than 6 feet; space markers not more than 20 feet on center.

****
Edit the following article to match project requirements; delete if not applicable to Project.
****

3.10 EMERGENCY SYSTEM IDENTIFICATION

A. Install identification for emergency system markers at the following locations and position markers so they can be read from floor:

1. Front of each emergency system generator.

2. Front and rear of each free-standing emergency system switchgear or switchboard section.

3. Front of each low-voltage transformer, panelboard, industrial control panel, motor control center, enclosed circuit breaker, safety switch, and motor controller enclosure, including those furnished with mechanical equipment.

4. Cover of each pull box and junction box containing emergency system conductors.

5. Each emergency system conduit longer than 6 feet; space markers not more than 20 feet on center.

3.11 WARNING SIGNS

A. Install warning signs at the following locations and position signs so they can be read from floor:

****
Edit the following articles to match project requirements; delete any that do not apply to Project.
****

1. Front and rear of each medium-voltage switchgear.

2. Front of each medium-voltage transformer.

3. Front and rear of each low-voltage switchgear or switchboard section.

4. Front of each low-voltage transformer, switchboard, panelboard, industrial control panel, motor control center, enclosed circuit breaker, safety switch, and motor starter enclosure including those furnished with mechanical equipment.

5. Cover of each pull box containing exposed low or medium-voltage conductors.

3.12 ARC FLASH WARNING LABELS

A. Install arc flash warning labels at the following locations and position signs so they can be read from floor:

****
Edit the following articles to match project requirements; delete any that do not apply to Project.
****

1. Front and rear of each medium-voltage switchgear.

2. Front of each medium-voltage transformer.

3. Front and rear of each freestanding low-voltage switchgear or switchboard section.

4. Front of each low-voltage transformer, panelboard, industrial control panel, motor control center, enclosed circuit breaker, safety switch, and motor controller enclosure, including those furnished with mechanical equipment.

5. Cover of each pull box containing exposed low or medium-voltage conductors.

3.13 WORKING SPACE FLOOR MARKERS

A. Install floor marking tape or paint on the floor at the locations listed below to indicate working space required by the NEC.

****
Edit the following articles to match project requirements; delete any that do not apply to Project.
****

1. Front and rear of each medium-voltage switchgear.

2. Front of each medium-voltage transformer.

3. Front and rear of each free-standing low-voltage switchgear or switchboard section.

4. Front of each low-voltage transformer, switchboard, panelboard, industrial control panel, motor control center, enclosed circuit breaker, safety switch, and motor controller enclosure including those furnished with mechanical equipment.

5. Any other equipment likely to require examination, adjustment, servicing, or maintenance while energized.

B. Dimensions of working space area shall be as follows:

1. Width: the greater of the width of the equipment or 30 inches.

2. Depth:

****
Edit the following articles to match project requirements; delete any that do not apply to the Project. Verify voltages in specialized equipment installed as part of the Project.
****

a. 120/240-volt and 208Y/120-volt equipment: 3 feet

b. 480-volt and 480Y/277-volt equipment with exposed live parts on one side of the working space and no live parts on the other side of the working space: 3-1/2 feet.

c. 480-volt and 480Y/277-volt equipment with exposed live parts on both sides of the working space: 4 feet.

d. 4160Y/2400-volt equipment with exposed live parts on one side of the working space and no live parts on the other side of the working space: 4 feet.

e. 4160Y/2400-volt equipment with exposed live parts on both sides of the working space: 5 feet.

f. 13,200-volt equipment with exposed live parts on one side of the working space and no live parts on the other side of the working space: 5 feet.

g. 13,200-volt equipment with exposed live parts on both sides of the working space: 6 feet.

C. Thoroughly prepare floor surface to receive tape or paint.

D. Where marking tape is used, outline working space with tape then infill with diagonal tape stripes placed 6 inches on center.

E. Where paint is used, cover working space area with alternating 3 to 6 inch wide black and white diagonal stripes.

3.14 WORKING SPACE LABELS

A. Install working space labels at the following locations and position signs so they can be read from floor:

****
Edit the following articles to match project requirements; delete any that do not apply to Project.
****

1. Front and rear of each medium-voltage switchgear.

2. Front of each medium-voltage transformer.

3. Front and rear of each freestanding low-voltage switchgear or switchboard section.

4. Front of each low-voltage transformer, panelboard, industrial control panel, motor control center, enclosed circuit breaker, safety switch, and motor controller enclosure, including those furnished with mechanical equipment.

5. Any other equipment likely to require examination, adjustment, servicing, or maintenance while energized.

3.15 UNDERGROUND WARNING TAPE

A. Install underground warning tape in trench above underground conduit, 1 foot below ground surface.

3.16 ONE-LINE DIAGRAM CABINET(S)

A. Install one-line diagram cabinet(s) in the main electrical room plus the following locations:

****
Edit the following articles to match project requirements; delete any that do not apply to Project.
****

1. Emergency generator room

2. UPS room

3. [Other locations as indicated on the Drawings]

B. Install cabinets in accordance with the manufacturer's instructions.

C. Install the following documents in the cabinets:

1. Electrical one-line diagram(s) of system.

2. Special operating instructions and emergency procedures to include:

   a. Main-tie-main transfers
   b. ATS bypass
   c. UPS bypass
   d. Key interlocks
   e. [ ]

END OF SECTION

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Do not delete the following reference information.
****

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 26 0553 Rev. 0, dated January 6, 2006.